

CLAIMS

5 1. An oligonucleotide comprising from about 2 to about 100 nucleotides and containing at least one unmethylated CpG dinucleotide.

2. The oligonucleotide of claim 1 which is represented by the following formula:

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wherein C and G are unmethylated, X_1 , X_2 , X_3 and X_4 are nucleotides and a GCG trinucleotide sequence is not present at or near the 5' and 3' termini.

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3. The oligonucleotide of claim 2 having a phosphate backbone modification.

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4. The oligonucleotide of claim 3 wherein the phosphate backbone modification is a phosphorothioate backbone modification.

5. The oligonucleotide of claim 4 comprising the following nucleotide sequence:

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5' GGGGTCAACGTTGAGGGGGG 3' (SEQ ID NO:1)

6. The oligonucleotide of claim 5 having a phosphate backbone modification.

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7. The oligonucleotide of claim 6 wherein the phosphate backbone modification is a phosphorothioate modification.

8. An oligonucleotide delivery complex comprising the oligonucleotide of claim 1 and a targeting means.

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9. An oligonucleotide delivery complex of claim 8, wherein the targeting means is selected from the group consisting of cholesterol, virosome, liposome, lipid, a target cell specific binding agent

10. A pharmaceutical composition comprising the oligonucleotide of claim 9 and a pharmaceutically acceptable carrier.

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11. A pharmaceutical composition comprising the oligonucleotide of claim 2 and a pharmaceutically acceptable carrier.

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12. A method for activating a subject's B cells comprising contacting the B cells with an effective amount of the oligonucleotide of claim 1.

13. A method for activating a subject's B cells comprising contacting the B cells with an effective amount of the oligonucleotide of claim 2.

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14. A method for activating a subject's natural killer cells comprising contacting the natural killer cells with an effective amount of the oligonucleotide of claim 1.

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15. A method for activating a subject's natural killer cells comprising contacting the natural killer cells with an effective amount of the oligonucleotide of claim 2.

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16. A method for treating, preventing or ameliorating an immune system deficiency in a subject comprising administering to the subject an effective amount of a pharmaceutical composition of claim 10.

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17. A method for treating, preventing or ameliorating an immune system deficiency in a subject comprising the steps of:

a) contacting lymphocytes obtained from the subject with a composition of claim 1 ex vivo, thereby producing activated lymphocytes; and

b) readministering the activated lymphocytes obtained in step a) to the subject.

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18. A method for vaccinating a subject comprising administering to the subject a composition of claim 10 in conjunction with administration of a vaccine.

- 5 19. A method for treating a disease associated with an immune system activation in a subject comprising administering to the subject an effective amount of a neutral oligonucleotide alone or in conjunction with a pharmaceutically acceptable carrier.
20. A method of claim 19 wherein the disease associated with immune system activation is systemic lupus erythematosus.
- 10 30. A method of claim 19 wherein the disease associated with immune system activation is sepsis.
- 15 31. An improved method for performing antisense therapy comprising methylating CpG containing oligonucleotides prior to administration to a subject.
- 20 32. An improved method for in vivo diagnoses using oligonucleotide probes comprising methylating CpG containing oligonucleotides prior to administration to a subject
- 25 33. An oligonucleotide which is capable of interfering with the activity of viral or cellular transcription factors and containing a consensus immunoinhibitory CpG motif represented by the formula:
- $$5'GCGX_nGCG3'$$
- wherein X = a nucleotide and n = in the range of 0-50.
- 30 34. An oligonucleotide of claim 33, wherein X is a pyrimidine.
- 35 35. An oligonucleotide of claim 34, wherein X_n is a CpG dinucleotide
36. A method for treating or preventing a viral infection in a subject comprising administering to the subject an immunoinhibitory oligonucleotide of claim 33.